Charge to the Peer Reviewers:
Human Health and Other Relevant Indicators
for the U.S. Environmental Protection Agency's
2007 *Report on the Environment* Technical Document
May 20, 2005

The U.S. Environmental Protection Agency (EPA) has asked that independent peer reviewers critically review the indicators that the Agency proposes to use for its 2007 *Report on the Environment*—Technical Document (ROE07 TD). The purpose of this peer review is to ensure that the proposed indicators are appropriate, adequate, and useful for evaluating human health in general; useful for answering the questions posed in ROE07; meet technical requirements (including the indicator definition and criteria); are properly documented; and are scientifically sound. Separate peer reviews will be conducted for the indicators proposed for each of the five main chapters in the ROE07. This charge provides background and instructions for peer review of the *human health* indicators. It includes the following sections and attachments:

- Section 1: Background information on ROE07 TD
- Section 2: Indicator definition and criteria
- Section 3: Charge and materials for the individual pre-workshop review
- Section 4: The peer review meeting
- Attachment 1: Questions and Proposed Indicators for the ROE07 Technical Document
- Attachment 2: Comment Sheet for Group 1 Indicators
- Attachment 3: Comment Sheet for General Questions for Group 1 Indicators
- Attachment 4: Comment Sheet for Group 2 Indicators
- Attachment 5: List of and EPA Rationale for Withdrawn ROE03 Indicators (will be posted by 6/10/05)
- Attachment 6: Indicator Materials for Review (included as subsequent sections of this binder).

Section 1: Background

In 2003, EPA published its first draft *Report on the Environment* (ROE03). ROE03 is a set of two question-driven reports comprising:

- A Technical Document (TD), which provides the scientific foundation for the ROE.
- A shorter Public Document that distills information in the TD for a non-technical audience.

These two reports were intended to identify and present the best available national-level indicators to help answer broad questions about the state of the nation's environment in five topic areas (chapters): air, water, land, human health, and ecological condition. In addition to reporting what we know, the ROE03 was also intended to point out where current data and understanding fall short of fully answering the questions in terms of delivering national, consistent, comprehensive data about the state of the nation's air, water, land, human health, and ecological condition. The ROE03 also presented some contextual information from other scientific sources in order to provide background and explain indicator data gaps.

EPA's Administrator has requested that the generation of Reports on the Environment be continued into the future. Current plans are for future reports to be developed on an approximately 3-year reporting cycle. To support the next anticipated ROE release in 2007, EPA has compiled a set of proposed indicators to help answer the questions posed for the 2007 Technical Document. EPA proposes reporting on both national-level indicators, national-level indicators that are provided at the scale of EPA regions, as well as several region-level indicators. As with ROE03, the questions are organized into five topic areas: air, water, land, human health, and ecological condition. There will be a separate chapter in the ROE07 Technical Document for each topic area. Each chapter will describe the set of questions for the topic area and the indicators that answer those questions.

Many of the indicators proposed for ROE07 were presented in ROE03, but some are new and others have new data sources. In addition, after refining the indicator definition and criteria (see boxes on the following pages), and applying both more consistently to the proposed indicator list, EPA recommends that some indicators from ROE03 not be presented in 2007.

To ensure that the indicators presented in the ROE07 TD are supported by data that are technically sound, meet the established indicator definition and criteria, and help answer the questions posed in the ROE, EPA has contracted with ERG to organize an independent peer review of the proposed ROE07 indicators.

Reviewers for the human health indicators are charged with four tasks:

1) Assess whether the proposed human health indicators are appropriate, adequate, and useful for evaluating and establishing an overall picture of human health.

2) Evaluate the proposed indicators with respect to their importance in terms of their ability to respond to the question.

3) Evaluate the proposed human health and related indicators and their underlying data with respect to the ROE indicator definition and criteria presented below.

4) Identify any additional ***national-level*** human health indicators that currently exist which meet the ROE indicator definition and criteria, help to answer one of the ROE questions, and for which data are readily available such that text and graphics describing the indicator could be developed within a short time frame (approximately 6 weeks).

Section 2: Indicator Definition and Criteria

Each indicator in ROE07 should conform to the following definition.

Definition: Indicator

For purposes of the ROE, an "indicator" is ***a numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition*** *over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment*. Indicators and their underlying data must meet criteria (see box below) for data quality, comparability, representativeness, and adequate coverage in time and space. Note that indicators rely on an underlying database or set of databases, but the databases themselves are not indicators.

In the above definition, "derived from" means that trends in *actual environmental observations* (e.g., rather than estimates or projections) must serve as the principal driver for trends in the indicators.

EPA has defined six indicator levels, as follows. Note that levels 1 and 2 are administrative indicators that measure progress in implementing environmental programs, and compliance with or response to those programs. They are *not* the subject of ROE07. Levels 3 through 6 indicators reflect environmental results/condition and are the subject of ROE07.

Description of Indicator Levels

Level 1 (Administrative—not covered by ROE07): Government Regulations/Activities. Examples: policy leadership, statutes, regulations, guidance, information.

Level 2 (Administrative—not covered by ROE07): Actions/Responses by Regulated and Non-regulated Parties. Examples: Pollution prevention and control, recycling, changes in consumer behavior, best management practices.

Level 3 (Environmental): Changes in Pressure or Stressor Quantities. Examples: Pollutants entering media, habitats altered or destroyed, hydrologic alteration.

Level 4 (Environmental): Ambient Conditions. Examples: Pollutant concentrations in media, food and drinking water, solid wastes in landfills, radiation; temperature, habitat condition, hydrology.

Level 5 (Environmental): Exposure or Body Burden/Uptake. Examples: Biological markers of uptake in people, plants, animals, or microorganisms.

Level 6 (Environmental): Changes in Human Health or Ecological Condition. Examples: Morbidity, mortality, biotic structure, and ecological processes.

Each indicator in ROE07 should conform to the following criteria:

Indicator Criteria

1) The indicator makes an important contribution to answering a question for the ROE. (In this context, "important" means that the indicator answers a substantial portion of and/or a critical part of the question.)
2) The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.
3) The underlying data are characterized by sound collection methodologies, data management systems that protect their integrity, and quality assurance procedures.
4) Data are available to describe changes or trends, and the latest available data are timely.
5) The data are comparable across time and space, and representative of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.
6) The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.

Section 3: Charge and Materials for the Individual Pre-Workshop Review

Attachment 1 lists all the ***proposed questions*** and ***associated indicators*** for the 2007 ROE by topic area. Pages 10 to 11 list the indicators to be reviewed by human health reviewers. Note that, for review purposes, there are two groups of indicators:

- **Group 1: Proposed Human Health Indicators.** Indicators that are proposed to answer one of the three questions posed in the human health chapter *and* that will be *written up in that chapter*.

- **Group 2: Three Relevant Indicators from Other Chapters.** Each of these indicators is *proposed to answer a question in another chapter* and will be written up in that chapter, but peer-reviewed by human health reviewers since it is related to health.

The materials and instructions for reviewing each group of indicators are described below. Please conduct the review in the sequence indicated. Forms are provided as Attachments 2 through 4 to this charge to structure your review. Attachment 5 provides background for Step 2, below. The materials to be reviewed are provided in Attachment 6.

Step 1: Review Group 1 Indicators

For each indicator in Group 1, Attachment 6 provides:

- *Draft text* introducing the indicator, identifying the underlying data used to evaluate the indicator, and describing data interpretations. EPA proposes including this text in the ROE07 TD.

- *Draft graphic(s)/table(s)* to help readers visualize spatial and temporal trends in the indicator. EPA proposes including these graphics in the ROE07 TD. (Note that some of the indicators also have a brief text describing the method used to compile the EPA regional data.)

- *An information quality review form* that presents detailed background information on the indicator and its supporting data (e.g., data quality, coverage, processing). EPA documents this information for the overall project record and to facilitate peer review of the indicators.

Collectively, these three items should adequately present each indicator and thoroughly document the information that EPA considered when evaluating the indicators for ROE07. For each indicator in this category, you should thoroughly review the draft text, draft graphics/tables, and information quality review forms provided. Then, document your review comments by filling out the "Comment Sheet" in Attachment 2 *for each indicator*.

This sheet asks you a series of questions about each indicator. For questions 1 through 4, you are asked to provide a numerical response on a scale of 1 to 4 and then a written explanation of the rationale for your numerical response. Question 5 asks about graphical presentation and question 6 asks you to provide any other comments, concerns, or suggestions about the indicator that you did not already cover in your responses to Questions 1 through 5. Question 7 asks you to state whether you think the indicator merits inclusion in ROE07.

Step 2: Consider General Questions for Group 1 Indicators

After completing your reviews for the individual Group 1 indicators, as described above, please use Attachment 3 to answer the following two questions for these indicators:

- **General Question 1:** Considering the Group 1 indicators collectively, do any of these indicators clearly seem to be more appropriate, adequate, or useful for evaluating and/or establishing an overall picture human health than others? Do any seem to be more important than the others for answering the question they are intended to answer? Note: An indicator may be judged less important if it makes a smaller or less critical contribution to answering the question posed than the other indicators or if it covers an area of diminishing interest environmentally.

- **General Question 2:** Are there any additional ***national-level*** indicators that currently exist, but were not proposed for ROE07, that you would recommend for ROE07? Proposed indicators should meet the ROE indicator definition and criteria, be national in

scale, make an important contribution to answering one of the ROE questions in your topic area, be of a quality that likely would pass this type of peer review, and have data that are readily available (e.g., could be compiled within 6 weeks or less). For any new indicators proposed, provide detailed justification for their inclusion and list references or citations for the associated underlying data sources. As you consider this question, please read Attachment 5, which provides the list of human health and other indicators presented in ROE03 that EPA does not intend to carry forward to ROE07, along with EPA's rationale for withdrawing them. If you disagree with EPA's rationale and feel any of these indicators should be included in ROE07, please so indicate in your response to this question, along with your rationale for why they should be included. Note: The full text and graphics for the ROE03 indicators can be viewed on-line at: http://www.epa.gov/indicators/roe/html/tsd/tsdHealth.htm

Step 3: Review Group 2 Indicators

Group 2 indicators are indicators that are *proposed to answer a question in another chapter* and will be written up in that chapter, but peer-reviewed by human health reviewers since they are related to human health. You are asked to review the three Group 2 indicators in the same way you reviewed Group 1 indicators under Step 1. For each Group 2 indicator, Attachment 6 provides:

- *Draft text* introducing the indicator, identifying the underlying data used to evaluate the indicator, and describing data interpretations.

- *Draft graphic(s)/table(s)* to help readers visualize spatial and temporal trends in the indicator.

- *An information quality review form* that presents detailed background information on the indicator and its supporting data (e.g., data quality, coverage, processing).

Collectively, these three items should adequately present the indicator and thoroughly document the information that EPA considered when evaluating the indicator for ROE07. For each indicator, you should thoroughly review the draft text, draft graphics/tables, and information quality review form provided in Attachment 6. Then, document your review comments by filling out the "Comment Sheet" in Attachment 4 *for each indicator*.

Preparing for the Peer Review Workshop

After receiving the reviewers' pre-meeting comments, ERG will compile these comments and distribute them to all peer reviewers. Please familiarize yourself with the pre-meeting comments of the other human health peer reviewers prior to the peer review workshop.

Note that the pre-meeting comments are preliminary in nature and are intended to help initiate discussion at the peer review meeting. Reviewers may change their comments based on discussion at the peer review meeting.

Section 4: The Peer Review Meeting

Most of the peer review meeting will take place with the peer reviewers split into breakout groups by topic area. Within each group, reviewers will consider the same questions they answered individually in their pre-meeting comments:

- Reviewers will discuss the merits of the individual Group 1 and Group 2 indicators based on responses provided on the "Comment Sheets" and, where possible, agree on a composite score for each indicator.

- Then, considering the Group 1 indicators collectively, reviewers will identify any indicators that clearly do not seem to be on the same level of importance as the other indicators.

- Finally, reviewers will discuss and, where possible, reach agreement on any possible other national-level indicators they believe EPA should consider for the ROE07 TD.

ERG will prepare a summary report of the discussions at the peer review workshop. This report will document the peer reviewers' final conclusions and recommendations regarding the indicators for ROE07 TD. You will have a chance to check ERG's draft report of the meeting for accuracy and completeness before it is finalized.

Attachment 1:

Questions and Proposed Indicators for the ROE07 Technical Document

Attachment 2: Comment Sheet for Group 1 Indicators

Please fill out a separate sheet for each Group 1 indicator.

Your Name: _____
Topic Area: **Human Health**
Indicator Name: _____

1) Please indicate the extent to which you think the proposed indicator is appropriate, adequate, and useful (AA&U) for evaluating human health and for contributing to an overall picture of human health.

1	2	3	4
Indicator is not AA&U	Indicator is of somewhat AA&U	Indicator is largely AA&U	Indicator is completely AA&U

Comments:

2) Please indicate the extent to which you think the proposed indicator makes an important contribution to answering the specific ROE question it is intended to answer (see Attachment 1 for list of questions). (Note: An indicator may be judged less important if it makes a smaller or less critical contribution to answering the question posed than the other indicators, or if it covers an area of less or diminishing importance environmentally.)

1	2	3	4
Indicator is not important	Indicator is of minor importance	Indicator is important	Indicator is critical

Comments:

3) To what extent do you think the indicator meets the following indicator definition:

An "indicator" is ***a numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition*** *over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment*.

1	2	3	4
Doesn't meet the definition	Only partly meets the definition	Largely meets the definition	Fully meets the definition

Please explain:

4) To what extent do you think the indicator meets each of the following indicator criteria:

a) The indicator makes an important contribution to answering a question for the ROE. (In this context, "important" means that the indicator answers a substantial portion of and/or a critical part of the question.)

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

b) The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

c) The underlying data are characterized by sound collection methodologies, data management systems that protect its integrity, and quality assurance procedures.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

d) Data are available to describe changes or trends, and the latest available data are timely.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

e) The data are comparable across time and space, and representative[1] of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

f) The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

Please explain:

[1] An indicator seeks to describe trends in an overall target "population" (e.g., land area, type of surface water, type of emissions, U.S. population), yet data often can only be sampled from a subset of this population. The validity of the trends described by the indicator will depend on the degree to which the sampled population is representative of the target population.

5) Do you have any suggestions for more effective graphic presentation of the data? If yes, please describe.

6) Please provide any additional comments, suggestions, or concerns regarding the indicator that you have not already noted in Questions 1 through 5. In particular, note any limitations to the indicator that you have not already described in your responses to the preceding questions.

7) Overall, this indicator:

_____ Should be included in ROE07 TD.

_____ Should be included in ROE07 TD with the modifications identified above.

_____ Should *not* be included in ROE07 TD.

Attachment 3: Comment Sheet for General Questions for Group 1 Indicators

Your Name: _____
Topic Area: **Human Health**

1) Considering the Group 1 indicators *collectively*, do any of these indicators clearly seem to be more appropriate, adequate, or useful for evaluating human health and/or for contributing to an overall picture of human health than others? Do any seem to be more important than the others for answering the question(s) they are intended to answer? (Note: An indicator may be judged less important if it makes a smaller or less critical contribution to answering the question posed than the other indicators or if it covers an area of diminishing interest environmentally.)

2) Are there any additional *national-level* indicators that make an important contribution to answering one of the ROE questions in your topic area, but were not proposed for ROE07, that you would recommend? (Proposed indicators should meet the ROE indicator definition and criteria, be national in scale, be of a quality that likely would pass this type of peer review, and have data that are readily available. For any new indicators proposed, provide justification for their inclusion and list references or citations for the associated underlying data sources.)

   As you consider this question, ***please read Attachment 5***, which provides the list of human health and other indicators presented in ROE03 that EPA does not intend to carry forward to ROE07, along with EPA's rationale for withdrawing them. If you disagree with EPA's rationale and feel any of these indicators should be included in ROE07, please so indicate in your response to this question, along with your rationale for why they should be included. Note: The full text and graphics for the ROE03 indicators can be viewed on-line at: http://www.epa.gov/indicators/roe/html/tsd/tsdHealth.htm

Attachment 4: Comment Sheet for Group 2 Indicators

Please fill out a separate sheet for each Group 2 indicator.

Your Name: _____
Topic Area (circle one): Air or Land
Indicator Name: _____

1) To what extent do you think the indicator meets the following indicator definition:

*An "indicator" is **a numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition** over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment.*

1	2	3	4
Doesn't meet the definition	Only partly meets the definition	Largely meets the definition	Fully meets the definition

Please explain:

2) To what extent do you think the indicator meets each of the following indicator criteria:

a) The indicator makes an important contribution to answering a question for the ROE. (In this context, "important" means that the indicator answers a substantial portion of and/or a critical part of the question.)

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

b) The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

c) The underlying data are characterized by sound collection methodologies, data management systems that protect its integrity, and quality assurance procedures.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

d) Data are available to describe changes or trends, and the latest available data are timely.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

e) The data are comparable across time and space, and representative[2] of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

f) The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

Please explain:

[2] An indicator seeks to describe trends in an overall target "population" (e.g., land area, type of surface water, type of emissions, U.S. population), yet data often can only be sampled from a subset of this population. The validity of the trends described by the indicator will depend on the degree to which the sampled population is representative of the target population.

3) Do you have any suggestions for more effective graphic presentation of the data? If yes, please describe.

4) Please provide any additional comments, suggestions, or concerns regarding the indicator that you have not already noted in Questions 1 through 3. In particular, note any limitations to the indicator that you have not already described in your responses to the preceding questions.

5) Overall, this indicator:

_____ Should be included in ROE07 TD.

_____ Should be included in ROE07 TD with the modifications identified above.

_____ Should *not* be included in ROE07 TD.

Attachment 5: List of and EPA Rationale for Withdrawn ROE03 Indicators

Background:
A number of indicators were included in EPA's 2003 Draft Report on the Environment (DROE03) that are not proposed to be included in ROE07. The general reasons for these changes are described below, followed by indicator-specific explanations.

> EPA's Science Advisory Board Committee review of the DROE03 recommended EPA develop and utilize a more precise definition of "indicator" than was used for DROE03.
>
> EPA developed a set of specific indicator criteria to provide a more precise conformance to Office of Management and Budget (OMB) and EPA Information Quality Guidelines.
>
> The ROE07 introduced a Regional Pilot Project and developed and implemented a relevant process. Sub-national or regional indicators that were included in DROE03 but did not go through this pilot are not recommended to be included in ROE07.

When screened against these factors, the ROE07 development team identified a small number of the indicators in DROE03 that did not appear to conform to one or more of these requirements. A group decision was made that developing indicator write-ups, quality forms, and graphics for these indicators was not the best use of team resources. Broadly speaking, the rationales for withdrawal fall into four categories, coded as follows:

> **(D) Definition** – The indicator fails to meet the improved indicator definition for ROE07 (most often because the indicator was a level 1 or 2 indicator, rather than a level 3, 4, 5, or 6 indicator).
>
> **(C) Criteria** – The indicator fails to meet one of the six indicator criteria that were established to conform with EPA Information Quality Guidelines.
>
> **(N) New indicator** – The indicator is replaced by a "new" and superior indicator that was not available for the DROE03.
>
> **(R) Regional** – The indicator is not national in scope and is not part of the ROE07 EPA Regional Pilot Project.

The following information briefly explains the rationale for excluding specific indicators from development for the ROE07 Indicator Peer Review. Each indicator is categorized as D, C, N, or R. The indicators are organized by general peer review topic.

Air

Production of Ozone Depleting Substances - C

This DROE03 indicator presents estimates of the amount of ODSs produced worldwide in 1986 and 1999, and annual U.S. production from 1958 to 1993. This indicator is being withdrawn because of issues concerning data reliability and relevance. Global ODC production data are not reliable with respect to comparability among reporting countries. The US estimates are more reliable because of legal reporting requirements and the small number of sources. However, the data set fails to account for imports, and annual production is not a good surrogate for emissions of ODCs into the environment because of the time between production and eventual entry into the environment is highly variable among the various products and recovery systems.

Number of People Living in Counties with Ambient Air Concentrations Above the NAAQS - C

This DROE03 indicator conveyed how many people (based on census) lived in counties where air pollutant levels at times were above the level of the NAAQS during the year stated. It was intended to give the reader some indication of the number of people potentially exposed to unhealthy air. Because of changing populations and air quality standards, however, this indicator masks actual trends in the levels of air pollutants. It is not a valid exposure indicator because it is not based on measurement of an actual marker of exposure measured on individuals.

Percent of Population Living in Homes Where Someone Smokes Regularly Inside the Home - D

This DROE indicator portrayed the percentage of homes in the U.S. in which young children were exposed to tobacco smoke in 1998 versus 1957. The survey is based on a questionnaire (do children live in the home, and does someone who smokes regularly live in the home), rather than on actual measurements of the amount of smoke actually present or the degree to which children are exposed to the resulting smoke. This indicator violates the ROE indicator definition, requiring that indicators be based on actual measurements, and blood cotenine (Indicator 102) provides a better indicator of children's exposure to smoke.

Water

Altered Fresh Water Ecosystems – C
Percent Urban Land Cover in Riparian Areas – C
Agricultural Lands in Riparian Areas - C

These DROE03 indicators are based on the percentage of land within 30 m of the edge of a stream or lake that is classified as urban or agriculture based on 1991 satellite data (NLCD). Baseline data are incomplete, and there are no reference points for the appropriate percentage of such cover, and it is not clear that the indicators could be reproduced with newer satellite data. There are no data for other alterations such as damming, channelization, etc.

Number of Watersheds Exceeding Criteria for Mercury, PCBs, & Dioxin – C

This DROE03 indicator is based on voluntary reporting of Hg contamination using data that has not undergone formal QA/QC review. It is not representative of the nation, or suitable for trend monitoring.

Lake Trophic State Index – R, C

This DROE03 indicator is based on phosphorous data collected in a one-time a statistical sample of lakes in the Northeast US during 1991-94. It is not included in the ROE07 Regional Pilot Project.

Sedimentation Index – R, C

This DROE03 indicator is based on data collected on freshwater streams in the Mid Atlantic Highlands Region during a one-time 1993-94 statistical survey. It is not included in the ROE07 Regional Pilot Project.

Contaminants in Fresh Water Fish (NAWQA) – C

This DROE03 indicator is based on reported concentrations of contaminants in fish collected by the US Geological Survey NAWQA program. While the data are collected from a large number of streams and are of high and consistent quality, the sample is not statistically representative of the nation, there are no national guidelines to serve as reference values for tissue concentrations, and Cycle II of NAWQA will not include comparable routine monitoring of trace organics and trace elements in fish tissues at sampling sites across the Nation.

Fish Index of Biotic Integrity – R, C

This DROE03 indicator is based on fish community data collected on freshwater fish in the Mid Atlantic Highlands Region during a one-time1993-96 statistical survey. Condition cannot be assessed in streams where no fish were caught, because data were insufficient to indicate whether the stream had poor quality or simply no fish. It is not included in the ROE07 Regional Pilot Project.

Macroinvertebrate IBI (MAIA) – R, C

This DROE03 indicator is based on benthic macroinvertebrate community data collected in freshwater streams in the Mid Atlantic Highlands Region during a one-time 1993-96 statistical survey. It is not included in the ROE07 Regional Pilot Project**.**

Beach Days Open – D

Waters with Fish Consumption Advisories - D

These DROE03 indicators are based on the frequency of beach closures or fish consumption advisories as reported to EPA voluntarilyby states and local government organizations. The data are not nationally or temporally consistent because of different and changing criteria for closing beaches or issuing fish consumption advisories in the different states, many of which do not involve actual water quality measurements. They are therefore level 1 indicators and fail to meet the definition for ROE indicators.

Contaminated Sediments in Fresh Water - C

This DROE03 indicator is based on reported concentrations of sediment contaminants collected by a large number of organizations focusing particularly on places where sediment contamination is perceived to be a problem (the EPA National Sediment Inventory). The database suffers from a number of limitations: the data are heavily biased toward sites at which there is a known or suspected toxicity problem and to particular geographic areas (non-representative of the nation), the data cover different dates in different locations- making estimation of trends difficult, and the data and procedures used to assign sites to a toxicity category are not uniform from watershed to watershed. It is unsuitable for trend estimation.

Chemical Contamination in Streams and Groundwater – C

This DROE03 indicator is based on data from a large number of NAWQA watersheds. The sampling and analytical protocols (including the analytes measured) are not comparable across all NAWQA watersheds.

Nitrate in Farmland, Forested and Urban Streams and Groundwater
Phosphorus in Farmland, Forested, and Urban Streams – N

These DROE03 indicators are being replaced by two new indicators, "Nitrate, Phosphorus, and Pesticides in Streams in Agricultural Watersheds" and "Nitrate and Pesticides in Groundwater in Agricultural Watersheds." The NAWQA streams in forested and urban watersheds were based on a small sample size, and may not be representative of forested and urban streams in general.

Phosphorus in Large Rivers - C

The indicator is based on phosphorus concentrations in large rivers sampled periodically by the USGS National Stream Quality Accounting Network (NASQAN). Monitoring at many of the large river NASQAN sites has been discontinued.

Chemicals

Sediment Runoff Potential from Croplands and Pasturelands - C

This DROE03 indicator represents the estimated sediment runoff potential for croplands and pasturelands based on topography, weather patterns, soil characteristics, and land-use land cover and cropping patterns for the U.S. and the Universal Soil Loss equation www.brc.tamus.edu/swat. The indicator addresses "potential" and not actual/current condition, and relies on a model to predict ambient characteristics (level 4 indicators) based on level 3 measurements, which violates a fundamental ROE protocol on the use of models in indicators. Trends in this indicator would likely be associated only with trends in land cover, cropping practices, and weather (topography and soil type are unlikely to change). No reliable spatial trend data at the appropriate scale exist for either cropping practices or land cover, and consequently trends in this indicator would be difficult to calculate.

Potential Pesticide Runoff from Fields - C
Pesticide Leaching Potential - C

These DROE03 indicators represent the potential movement of agricultural pesticides from the site of application to ground and surface waters, based on estimates of pesticide leaching and runoff losses derived from soil properties, field characteristics, management practices, pesticide properties, and climate for 243 pesticides applied to 120 specific soils in growing 13 major agronomic crops. The indicators address "potential" and not actual/current condition, and rely on models to predict ambient characteristics (level 4 indicators) based on level 3 measurements, which violates a fundamental ROE protocol on the use of models in indicators.

Risk of Nitrogen Export - C
Risk of Phosphorus Export - C

These DROE03 indicators represent the potential movement of N and P from the site of application to surface waters, based on a large empirical dataset relating land use to N and P observed in receiving streams over several decades at a variety of locations. The indicators address "potential" and not actual/current conditions, and rely on statistical models to predict ambient characteristics (level 4 indicators) based on level 3 measurements, which violates a fundamental ROE protocol on the use of models in indicators.

Pesticide Use - C

Agricultural pesticide usage data, measured at the national aggregate level for all pesticides is very difficult to interpret, given the wide year to year changes in the types of pests being controlled for and changes in agricultural production/chemical usage from year to year. From one time period to another the mix of pesticides changes, pest pressures change, agricultural practices change, agricultural acreage changes, regulatory status of key uses changes, and many other important variables change. Moreover, the effects of pesticide usage are encountered at three levels of the product's life cycle: production, usage, and residues on foods. The geographic distribution of those effects renders difficult the interpretation of national usage levels for all pesticides, taken as a group. While it is of course possible to compare magnitudes of aggregates at different times, the real significance for the environment is in the differences in the content and geographic distribution of the aggregates, not in the magnitude of the aggregate.

Contaminated Lands

Number and Location of Superfund NPL Sites - D

This DROE03 indicator is a category 1 indicator (it represents an administrative decision to force a cleanup, rather than an amount of waste present or removed), and therefore does not meet the ROE07 indicator definition.

Number of RCRA Corrective Action Sites - D

This DROE03 indicator, by itself, is a category 1 indicator (it represents an administrative decision to force a cleanup, rather than an amount of waste present or removed), and therefore does not meet the ROE07 indicator definition. The data are being combined into a new indicator, Quantity of RCRA Hazardous Waste Generated and Managed (which combines information from several DROE03 indicators).

Radioactive Waste Storage and Disposal - C

This DROE03 indicator is based on production and inventory data collected by the Department of Energy. Although the data continue to be collected, they are no longer publicly available post-September 11, 2001; therefore ongoing data trends are not and will not in the future be available for this indicator. Moreover, the earlier data reflected two distinct periods in the history of waste generation in the nuclear weapons complex. The first reflected a period during which wastes and other materials were being generated as an integral part of the production of weapons grade nuclear materials and components. The period after 1989 reflected the cessation of large-scale production of such materials and the initiation of clean-up activities and wastes from those initiatives. Thus, even before the truncation of data in the post 9/11 period, there were significant issues with the comparability of the data over time.

Human Health

Cardiovascular Disease Prevalence - C

This DROE03 indicator was based on data from NHANES III (1988-1994). Currently, no national trend data are available on cardiovascular disease (CVD) prevalence.

Blood VOC – C

This DROE03 indicator was based on a convenience sample whose representativeness cannot be determined or necessarily used as a baseline for future sampling. The indicator is based on detects only, so there is no reference level, and VOCs are cleared from the bloodstream rapidly (~ 1hr), so there is a significant possibility of false negatives, considering that exposures tends to be associated with occupational and indoor settings.

Urinary Arsenic - R
This DROE03 indicator was based on data from EPA Region 5 only, and is not part of the ROE07 Regional Pilot.

Ecological Condition

The Farmland Landscape - C
This DROE03 indicator represents croplands and the forests or woodlots, wetlands, grasslands and shrublands, that surround or are intermingled with them, and the degree to which croplands dominate the landscape http://www.heinzctr.org/ecosystems/farm/lndscps.shtml. The indicator relies on data generated using early 1990's satellite data, and it is unclear whether the definition of "farmland landscape" is sufficiently precise to be replicated independently, especially with respect to any future satellite data availability.

Extent of Estuaries and Coastline – C
This DROE03 indicator is based on remote sensing data, but is unlikely to show trends unrelated to sea level rise and changing tides, so it is not a very useful indicator for trends.

Coastal Living Habitats - C
This DROE03 indicator is based on remote sensing data of coastal wetlands, mudflats, sea-grass beds, etc., but the only system for which a national indicator has been developed is coastal vegetated wetlands, which already is covered in another indicator.

Shoreline Types - C
This DROE03 indicator is based on NOAA's Environmental Sensitivity Index. The index is based on a standardized mapping approach, but coverage is not complete for large parts of the coastline and the data in some of the atlases are more than 15 years old. Consequently, this indicator is not appropriate for measurement of representative, national trends.

Extent of Ponds, Lakes, and Reservoirs – C
This DROE03 indicator is based on data from the USGS National Wetlands Inventory. While these data are based on a valid statistical sampling design, the total amount of surface water is less than half of the area of lakes, reservoirs and ponds greater than 6 acres in size in the USGS National Hydrography Data Set. Until this discrepancy is resolved, the indicator may not satisfy the ROE criteria.

At-Risk Native Species – C
At-Risk Native Grassland and Shrubland Species – C
At-Risk Native Forest Species – C
Populations of Representative Forest Species – C
Non-Native Fresh Water Species – C
At-Risk Fresh Water Plant Communities – C
The Ecological Condition chapter is being restructured from the DROE03 organization per the recommendation of EPA's Science Advisory Board and numerous stakeholders. As such, the chapter

no longer requires that the above indicators be broken out by ecosystem. In addition, the ability to track trends of many of these indicators is currently in question.

Population of Invasive and Non-invasive Bird Species – R

This DROE03 indicator is based on an analysis of USGS Breeding Bird Survey data in grassland and shrubland ecosystems for 5 year periods ranging from the late 1960s to 2000. Because the ecological condition questions are no longer directed at specific ecosystems types, this appears to be a regional indicator. It is not clear at this time that this indicator will be updated.

Bird Community Index – R

This DROE03 indicator is not national in scope or part of the ROE EPA Regional Pilot.

Fish Diversity – R

This DROE03 indicator is based on a statistical sample of fish trawls in Mid-Atlantic estuaries during 1997-98. This indicator is not part of the ROE07 Regional Pilot project, and EMAP is no longer collecting fish samples to support this indicator.

Fish Abnormalities - C

This DROE03 indicator is based on a statistical sample of fish trawls in estuaries in the Atlantic and Gulf, but the data are no longer being collected by EMAP to support this indicator.

Unusual Marine Mortalities – C

This DROE03 indicator is based on voluntary reporting of unusual mortality events to NOAA. Because there is no systematic requirement to report, these data are not suitable to support national trends in the indicator.

Animal Deaths and Deformities – C

This DROE03 indicator is based on data reported by a number of different organizations to USGS on incidences of death or deformities in waterfowl, fish, amphibians, and mammals. Trends are available only for waterfowl, and because data reporting is voluntary rather than systematic, the data are not adequate to determine actual trends versus trends in reporting.

Tree Condition – C

This DROE03 indicator is based on an ongoing statistical sample of forests across the conterminous US and comprises components that relate to crown (tree canopy condition), the ratio of dead to live wood, and the fire class. This indicator likely relates more to forest management practices than to environmental condition, and for this reason has low relevance value to EPA.

Processes Beyond the Range of Historic Variation – C

This DROE03 indicator is based on an analysis of recent Forest Inventory and Analysis data on climate events, fire frequency, and forest insect and disease outbreaks, which were then compared to anecdotal data for the period 1800-1850. Because the early data are anecdotal, and because the data mostly relate to forest management practices, etc., it is proposed that this indicator has low relevance and that trend data are of questionable utility as an ROE indicator.

Soil Compaction – C

Soil Erosion – C

These DROE03 indicator are based on an ongoing statistical sample of soils in forests across the conterminous US, but the actual indicators are based on models rather than measurement, and they likely relate more to forest management practices than to environmental condition, and for this reason have low relevance value to EPA.

Soil Quality Index - R

This DROE03 indicator was based on a survey of soils in the Mid Atlantic region during the 1990s, and was neither repeated and is not part of the Regional Pilot Project for ROE07.

Chemical Contamination – C

This DROE03 indicator combines data from the USGS NAWQA program that are not consistent in terms of sampling frequency or analytical protocols.

Attachment 6: Indicator Materials for Review

NOTE: ATTACHMENT 6 COMPRISES THE SUBSEQUENT SECTIONS OF THIS BINDER